10/588682
AP20 Rec'd PCT/PTO 08 AUG 2006

Substitute Specification

Partially structured heat exchanger fins

BACKGROUND

(1) FIELD OF THE INVENTION

[0001] The invention relates to a heat exchanger, in particular heat exchanger for a refrigerator unit, having a plurality of fins arranged essentially parallel to one another.

[0002] The invention furthermore relates to a refrigerator unit with at least one heat exchanger.

[0003] The term "heat exchanger" is to be understood below as meaning all types of heat exchanger, but in particular evaporators and coolers for refrigerator units and (sealing) air coolers, as are used, for example, in cold storage rooms.

[0004] The term "refrigerator unit" is to be understood below as meaning all types of goods presentation units which have at least one cooled space for goods. In this connection, it does not matter whether the cooled space or spaces for goods are designed for "normal cooling" or for "deep-freezing".

(2) PRIOR ART

[0005] In the case of heat exchangers of the generic type, three different solutions with regard to the arrangement of

the fins have been realized to date. In the first solution, all of the fins have the same dimensions and are arranged at regular distances from one another. In the second solution possibility, although the distances between the individual fins are identical, the fins have different dimensions - generally two different dimensions. In the third solution, two or more packages of fins which differ in respect of their dimensions and distances from one another are coupled to form a heat exchanger.

[0006] A common feature of the above-mentioned solutions is, however, that the fins used are designed such that they are either completely corrugated or are completely smooth or flat.

[0007] A disadvantage of the first solution possibility described above is that, in the event of comparatively large distances between the fins, the power density of the heat exchanger is comparatively low. If the distances between the fins are significantly reduced, the heat exchanger has a reduced service life, since the fins or the intermediate spaces formed by them ice up or frost over relatively rapidly. The second solution possibility described above requires a comparatively high outlay on manufacturing and, in addition, only provides a slight degree of variation with regard to the distance between the fins. The third solution possibility described above also has a very high outlay on manufacturing.

SUMMARY OF THE INVENTION

[0008] It is the object of the present invention to indicate a heat exchanger of the generic type which has a comparatively high power density while at the same time having a reduced outlay on manufacturing without, in this connection, the service life of the heat exchanger being reduced.

[0009] To achieve this object, a heat exchanger of the generic type is proposed which is characterized in that at least some of the fins are designed to be not smooth in part and smooth in part.

[0010] The term "not smooth" is to be understood below as meaning any desired shaping for those regions of the fins which are not smooth.

[0011] In this case, those regions of the fins which are not smooth are preferably designed to be corrugated.

[0012] According to an advantageous refinement of the heat exchanger according to the invention, those regions of the fins which are not smooth are provided in the entry region of the heat exchanger.

[0013] The term "entry region" is to be understood as meaning that region or that side of the heat exchanger via which the medium which is to be cooled or is to be heated by means of the heat exchanger enters the regions between the fins.

[0014] As already mentioned at the beginning, the invention furthermore relates to a refrigerator unit with at least one heat exchanger.

[0015] In the case of said refrigerator unit, the heat exchanger or at least one of the heat exchangers is now designed as a heat exchanger according to the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The Figure illustrates a heat exchanger in accordance with the present invention.

[0017] The heat exchanger according to the invention and further refinements of the same which constitute the subject matter of the dependent patent claims will be explained in more detail below with reference to the exemplary embodiment illustrated in the figure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0018] The figure shows a possible embodiment of the heat exchanger 1 according to the invention as used, for example, as an evaporator in refrigerator units. Heat exchangers 1 of this type are formed from a multiplicity of fins 2 arranged at an identical distance. According to the invention, these fins 2 are now designed to be not smooth in part, preferably

- as illustrated in the figure - to be corrugated (region 2a) and to be smooth in part (region 2b).

[0019] The figure furthermore illustrates the entry lines 3 for the refrigerating agent or medium supplied to the heat exchanger 1, and the corresponding outlet line 4.

[0020] The medium which is to be heated or cooled by means of the heat exchanger according to the invention - in the event of the heat exchanger according to the invention being used in a refrigerator unit, the air circulating in the refrigerator unit constitutes this medium - enters the heat exchanger 1 or the intermediate spaces between the fins via the evaporator input side - illustrated by the arrow E - and leaves the heat exchanger 1 or the intermediate spaces on the outlet side - illustrated by the arrow A.

[0021] On the input side, the heat exchanger 1 according to the invention now has a higher power density - in comparison to a heat exchanger construction in which the fins are designed to be flat. This results from the fact that, owing to the fins 2a being designed to be not smooth, the effective surface of the fins is increased and the degree of turbulence in the flow of the medium guided through the heat exchanger 1 is increased.

[0022] The disadvantages cited in conjunction with the first solution possibility described above are avoided by the heat exchanger construction according to the invention, with the

outlay on manufacturing lying in the order of magnitude of the first solution possibility described above.

[0023] Care should preferably be taken to ensure that the dropping of the temperature below the dew point, which is possibly unavoidable, and therefore condensation of the medium to be cooled does not take place until in the region in which the fins 2 are designed to be flat or smooth (region 2b).